THE INVENTION CLAIMED IS:

1. A method for manufacturing a heterojunction bipolar transistor comprising:

providing a substrate;

forming an intrinsic collector structure on the substrate;

forming an extrinsic base structure partially overlapping the intrinsic collector structure;

forming an intrinsic base structure adjacent the intrinsic collector structure and under the extrinsic base structure;

forming an emitter structure adjacent the intrinsic base structure;

forming an extrinsic collector structure adjacent the intrinsic collector structure;

forming an interlevel dielectric layer; and

forming a plurality of contacts through the interlevel dielectric layer to the extrinsic collector structure, the extrinsic base structure, and the emitter structure.

2. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic base structure selectively grows a compound semiconductive material adjacent the intrinsic collector structure.

3. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein:

forming an extrinsic base structure surrounds the emitter structure with the extrinsic base structure; and

forming the collector structure surrounds the extrinsic base structure with the collector structure.

4. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the emitter structure, the extrinsic base structure, and the collector structure forms at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

5. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein;

forming the emitter structure forms an emitter structure substantially covering and parallel to the intrinsic base structure; and

forming the collector structure forms a collector structure that is substantially perpendicular to the emitter structure.

6. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic base structure forms a structure comprising at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

7. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the extrinsic base structure over the intrinsic collector structure comprises forming a base stack comprising the extrinsic base structure and an emitter structure.

8. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic collector structure comprises:

forming a first trench in the substrate; and

forming a second trench in the substrate spaced from the first trench to form the intrinsic collector structure between the first trench and the second trench.

9. A method of manufacturing a heterojunction bipolar transistor comprising:

providing a substrate;

forming a collector structure on the substrate;

forming a base stack comprising an extrinsic base structure and an extrinsic emitter structure over the collector structure;

forming an intrinsic base structure adjacent the collector structure;

forming an intrinsic emitter structure adjacent the intrinsic base structure;

forming an interlevel dielectric layer; and

forming a plurality of contacts through the interlevel dielectric layer in contact with the collector structure, the extrinsic base structure, and the extrinsic emitter structure.

10. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the base stack comprises:

forming an extrinsic base structure; and

forming an extrinsic emitter structure.

11. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein:

forming an extrinsic base surrounds the emitter structure with the extrinsic base structure; and

forming the collector structure surrounds the extrinsic base structure with the collector structure.

12. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the emitter structure, the extrinsic base structure, and the collector structure forms at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

13. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein;

forming the emitter structure forms an emitter structure substantially covering and parallel to the intrinsic base structure; and

forming the collector structure forms a collector structure that is substantially perpendicular to the emitter structure.

14. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the intrinsic base structure comprises:

forming a recess beneath the base stack; and

growing a compound semiconductive material in the recess.

15. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the intrinsic base structure forms a structure of at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

16. The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein;

forming the base stack forms an extrinsic base structure in contact with the intrinsic base structure;

forming the extrinsic collector structure forms a semiconductive material adjacent the intrinsic collector structure; and

forming the intrinsic emitter structure forms a semiconductive material adjacent the intrinsic base structure.

17. A heterojunction bipolar transistor comprising:

a substrate;

an intrinsic collector structure on the substrate;

an extrinsic base structure partially overlapping the intrinsic collector structure;

an intrinsic base structure adjacent the intrinsic collector structure and under the extrinsic base structure;

an emitter structure adjacent the intrinsic base structure;

an extrinsic collector structure adjacent the intrinsic collector structure;

an interlevel dielectric layer; and

a plurality of contacts through the interlevel dielectric layer to the extrinsic collector structure, the extrinsic base structure, and the emitter structure.

18. The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic base structure is a structure comprising at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

19. The heterojunction bipolar transistor as claimed in claim 17 wherein:

the emitter structure is surrounded by the extrinsic base structure; and

the collector structure surrounds the extrinsic base structure.

20. The heterojunction bipolar transistor as claimed in claim 17 wherein the emitter structure, the extrinsic base structure, and the collector structure form at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

21. The heterojunction bipolar transistor as claimed in claim 17 wherein;

the emitter structure substantially covers and is parallel to the intrinsic base structure; and

the collector structure is substantially perpendicular to the emitter structure.

22. The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic base structure is adjacent the intrinsic collector structure.

23. The heterojunction bipolar transistor as claimed in claim 17 wherein the extrinsic base structure is in a base stack comprising an extrinsic emitter structure.

24. The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic collector structure comprises:

a first trench in the substrate; and

a second trench in the substrate spaced from the first trench to form the intrinsic collector structure between the first trench and the second trench.

25. A heterojunction bipolar transistor comprising:

a substrate;

a collector structure on the substrate;

a base stack comprising an extrinsic base structure and an extrinsic emitter structure over the collector structure;

an intrinsic base structure adjacent the collector structure;

an intrinsic emitter structure adjacent the intrinsic base structure;

an interlevel dielectric layer; and

a plurality of contacts through the interlevel dielectric layer in contact with the collector structure, the extrinsic base structure, and the extrinsic emitter structure.

26. The herterojunction bipolar transistor as claimed in claim 25 wherein:

the emitter structure is surrounded by the extrinsic base structure; and

the collector structure surrounds the extrinsic base structure.

27. The heterojunction bipolar transistor as claimed in claim 25 wherein the emitter structure, the extrinsic base structure, and the collector structure form at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

28. The heterojunction bipolar transistor as claimed in claim 25 wherein;

the emitter structure substantially covers and is parallel to the intrinsic base structure; and

the collector structure is substantially perpendicular to the emitter structure.

29. The heterojunction bipolar transistor as claimed in claim 25 wherein the base stack comprises:

an extrinsic base structure; and

an extrinsic emitter structure.

30. The heterojunction bipolar transistor as claimed in claim 25 wherein;

the base stack has a recess; and

the intrinsic base structure comprises a compound semiconductive material in the recess.

31. The heterojunction bipolar transistor as claimed in claim 25 wherein the intrinsic base structure comprises a structure of at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

32. A heterojunction bipolar transistor as claimed in claim 25 wherein;

the base stack comprises an extrinsic base structure in contact with the intrinsic base structure;

the extrinsic collector structure comprises a semiconductive material adjacent the intrinsic collector structure; and

the intrinsic emitter structure comprises a semiconductive material adjacent the intrinsic emitter structure.